

Missouri Department of Natural Resources

## Total Maximum Daily Load Information Sheet

### Monegaw Creek

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#### Water Body Segment at a Glance:

**County:** St. Clair  
**Nearby Cities:** Appleton City and Monegaw Springs  
**Length of impairment:** 3 miles  
**Pollutant:** Sulfate  
**Source:** Montee Abandoned Mine Lands



**TMDL Priority Ranking:** EPA established TMDL 2006

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#### Description of the Problem

##### Beneficial uses of Monegaw Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Human Health Protection (Fish Consumption)
- Boating and Canoeing

##### Use that is impaired

- Protection of Warm Water Aquatic Life

##### Standards that apply

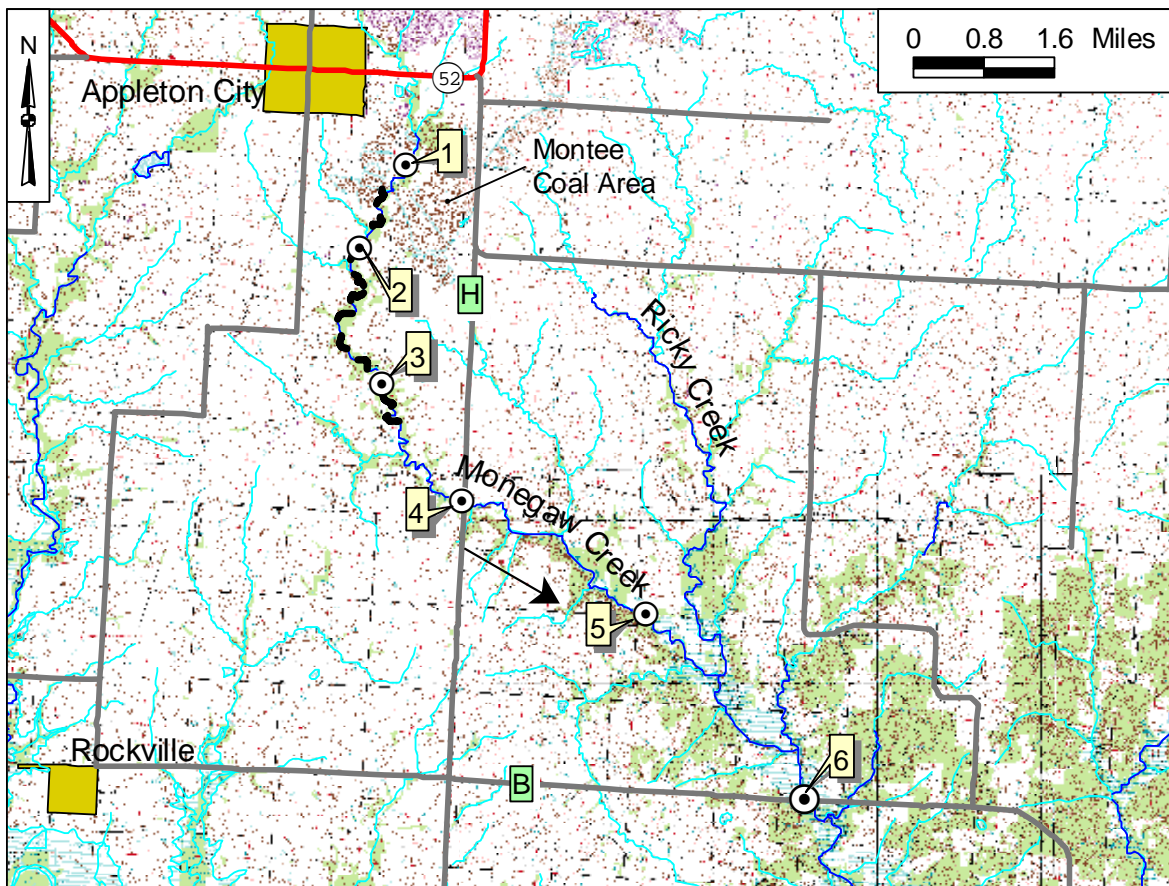
Missouri Water Quality Standards found in 10 CSR 20-7.031(4)(L) state: The concentration of chloride plus sulfate shall not exceed one thousand milligrams per liter (mg/L) or parts per million for protection of aquatic life. (Levels of chloride in Missouri streams are typically much less than 100 mg/L, so most dissolved substances problems are related to high levels of sulfate.)

##### Background Information and Water Quality Data

Monitoring of the specific conductivity (amount of dissolved substances) in Monegaw Creek near Appleton City indicated the stream had high levels of sulfate, which is harmful to aquatic life. For that reason, Monegaw Creek was placed on the 1998 303(d) impaired waters list, and monitoring of the stream for sulfate and chloride began in 2000. The Montee Abandoned Mine Lands around Monegaw Creek were identified as the source of the sulfate. Sulfide (containing sulfur) minerals, common in coal and the surrounding rock, oxidize in the presence of water and oxygen to form highly acidic, iron-rich and sulfate-rich drainage. The sulfate produced by this weathering may persist in water for a long time.

From 2000-2003, sulfate data sets were collected annually from several locations on Monegaw Creek. These data show sulfate plus chloride levels of 88–936 mg/L in the section of stream on the 303(d) list. The stream did not exceed water quality standards (WQS) for sulfate in that time frame. However, in 2005 and 2006, it exceeded WQS once at Site #2 and three times out of four at a new site about 1.4 miles below Site #1. The U.S. Environmental Protection Agency (EPA) established the TMDL August 17, 2006, setting the target at 900 mg/L SO<sub>4</sub> + Cl with a margin of safety of 100 mg/L SO<sub>4</sub> + Cl. A map of the area with sampling sites and a table of the data may be found below.

### Monegaw Creek in St. Clair County, Missouri, with Sampling Sites



--- Impaired Segment      → Direction of Flow

Site Index	
1	Monegaw Creek at County Road (CR) NW 1000 (about 1 mile below Appleton City)
2	Monegaw Creek at CR NW 900
3	Monegaw Creek at CR NW 1301
4	Monegaw Creek at Highway H (7 miles below Appleton City)
5	Monegaw Creek at CR NW 1001
6	Monegaw Creek at Highway B

## Sulfate and Chloride Data from Monegaw Creek, 2000-2006

Site #	Site Name	Year	Mo	Day	SC	SO4	Cl	SO4+Cl
1	Monegaw Cr. @ CR NW 1000	2000	2	8	1510	692	22	714
1	Monegaw Cr. @ CR NW 1000	2000	3	23	1220	559	23	582
1	Monegaw Cr. @ CR NW 1000	2002	9	26	990	315	56	371
1	Monegaw Cr. @ CR NW 1000	2003	5	29	1291	545	25.8	571
1	Monegaw Cr. @ CR NW 1000	2003	10	21	1150	371	42	413
1	Monegaw Cr. @ CR NW 1000	2003	10	29	1400	521	36.7	558
2	Monegaw Cr. @ CR NW 900	2005	3	16	2000	1060	15	<b>1075</b>
2	Monegaw Cr. @ CR NW 900	2005	8	12	2180	1320	13	<b>1333</b>
2	Monegaw Cr. @ CR NW 900	2006	2	2	2480	1480	15	<b>1495</b>
2	Monegaw Cr. @ CR NW 900	2006	4	7	1716	960	24.6	985
3	Monegaw Cr. @ CR NW 1301	2000	2	8	1790	910	26	936
3	Monegaw Cr. @ CR NW 1301	2000	3	23	1040	506	16	522
3	Monegaw Cr. @ CR NW 1301	2001	10	3	1440	669	29.1	698
3	Monegaw Cr. @ CR NW 1301	2003	5	29	1501	716	21.4	737
3	Monegaw Cr. @ CR NW 1301	2003	10	21	1470	630	25	655
3	Monegaw Cr. @ CR NW 1301	2003	10	29	1480	582	29.5	612
3	Monegaw Cr. @ CR NW 1301	2005	3	16	1883	946	16	962
3	Monegaw Cr. @ CR NW 1301	2006	2	2	1980	1060	23	<b>1083</b>
3	Monegaw Cr. @ CR NW 1301	2006	4	7	1743	958	24	982
4	Monegaw Cr. @ Hwy H	2000	2	8	1520	753	35	788
4	Monegaw Cr. @ Hwy H	2000	3	23	830	376	14	390
4	Monegaw Cr. @ Hwy H	2001	10	3	1220	547	23.5	571
4	Monegaw Cr. @ Hwy H	2002	9	26	668	238	9	247
4	Monegaw Cr. @ Hwy H	2003	5	29	1258	556	20.3	576
4	Monegaw Cr. @ Hwy H	2003	10	21	1490	637	22	659
4	Monegaw Cr. @ Hwy H	2003	10	29	1470	604	23.7	628
4	Monegaw Cr. @ Hwy H	2005	3	16	1644	808	17	825
4	Monegaw Cr. @ Hwy H	2005	8	12	1705	837	21	858
4	Monegaw Cr. @ Hwy H	2006	2	2	1562	937	24	961
4	Monegaw Cr. @ Hwy H	2006	4	7	1649	963	24.8	988
5	Monegaw Cr. @ CR NW 1001	2000	2	8	1820	899	22	921
5	Monegaw Cr. @ CR NW 1001	2000	3	23	590	235	13	248
5	Monegaw Cr. @ CR NW 1001	2001	10	3	1120	487	20.2	507
5	Monegaw Cr. @ CR NW 1001	2002	9	26	541	163	8	171
5	Monegaw Cr. @ CR NW 1001	2003	5	29	928	374	18	392
5	Monegaw Cr. @ CR NW 1001	2003	10	21	979	374	18	392
5	Monegaw Cr. @ CR NW 1001	2003	10	29	1140	443	19.7	463
5	Monegaw Cr. @ CR NW 1001	2005	3	16	1347	359	17	376
5	Monegaw Cr. @ CR NW 1001	2005	8	12	1525	738	20	758
5	Monegaw Cr. @ CR NW 1001	2006	2	2	1644	956	20	976
5	Monegaw Cr. @ CR NW 1001	2006	4	7		883	22	905

6	Monegaw Cr. @ Hwy B	2000	2	8	1470	694	19	713
6	Monegaw Cr. @ Hwy B	2000	3	23	417	144	12	156
6	Monegaw Cr. @ Hwy B	2001	10	3	1000	421	14.7	436
6	Monegaw Cr. @ Hwy B	2002	9	26	424	77	11	88
6	Monegaw Cr. @ Hwy B	2003	5	29	665	665	16.4	681
6	Monegaw Cr. @ Hwy B	2003	10	21	570	201	14	215
6	Monegaw Cr. @ Hwy B	2003	10	29	671	243	13.8	257
6	Monegaw Cr. @ Hwy B	2005	3	16	908	361	16	377
6	Monegaw Cr. @ Hwy B	2005	8	12	1065	502	19	521
6	Monegaw Cr. @ Hwy B	2006	2	2	1517	767	17	784
6	Monegaw Cr. @ Hwy B	2006	4	7	1180	674	16.4	690

Abbreviations: @ = at; Mo = month; pH in Standard Units; SC = Specific Conductivity in  $\mu$ mhos/cm; SO<sub>4</sub> = Sulfate in mg/L; Cl = Chloride in mg/L

Missouri's water quality standard for sulfate plus chloride is 1000 mg/L in streams with a 7Q10 (low) flow of one cubic foot per second or less (which Monegaw Creek is assumed to have). The state's 303(d) Listing Methodology Document specifies that to be considered unimpaired, a stream cannot exceed this standard more than 10 percent of the time. There are only two sites on Monegaw Creek where there have been any recorded exceedences. At CR NW 900, three out of four samples have shown exceedences. While very suggestive of a possible impairment, the data set at this site is too small to base an assessment on (Listing Methodology procedure). At CR NW 1301, one out of nine samples has shown an exceedence. This is an 11 percent exceedence rate (and so would be considered impaired), but the Type I error rate is 23 percent, which is greater than the acceptable error rate of 10 percent. That is to say, there is a 77 percent chance that this creek is impaired, but the Methodology specifies that the probability of impairment should be 90 percent or more. Therefore, this segment of Monegaw Creek will be prioritized for further monitoring in order to determine if an impairment exists.

**For more information call or write:**

Missouri Department of Natural Resources

Water Protection Program

P.O. Box 176

Jefferson City, MO 65102-0176

1-800-361-4827 or (573) 751-1300 office

(573) 522-9920 fax

Program Home Page: [www.dnr.mo.gov/env/wpp/index.html](http://www.dnr.mo.gov/env/wpp/index.html)